

CLAIMS

- 1/ A method of automatically cutting out and unloading stacks of pieces from a lay-up (20) made up of superposed layers of sheet material, the method comprising: cutting out stacks of pieces from the lay-up on a cutting table (10), on the basis of recorded information relating to the locations of the pieces on the surface of the lay-up; and unloading (80) the stacks of pieces by means of at least one unloading tool that is controlled automatically;
- 5 splitting up the skeleton of the lay-up (20) into a plurality of portions while the stacks of pieces are being cut out on the cutting table (10);
- 10 progressively bringing the lay-up onto an unloading table (60) with the lay-up comprising the stacks of cut-out pieces and the skeleton of the lay-up as not separated from one another; and
- 15 successively unloading the stacks of cut-out pieces by causing the unloading tool (80) to be moved so as to bring it into contact with the stacks that have arrived on the unloading table, by using the information relating to the locations of the pieces, on the surface of the lay-up, and so as to take off each stack from the remainder of the lay-up merely by moving it substantially parallel to the plane of the lay-up, without interfering with the stacks of pieces that have not yet
- 20 been unloaded, the stacks of cut-out pieces and the portions of the skeleton of the lay-up being unloaded in a manner such as to clear the way on the unloading table (60) for the stacks of pieces that have not yet been unloaded.
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- 2/ A method according to claim 1, whereby the stacks of pieces are caused to slide over the unloading table (60).
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- 3/ A method according to claim 2, whereby, while they are being moved over the unloading table, the stacks of pieces are supported by a cushion of air.
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- 4/ A method according to claim 1, whereby the stacks of pieces are caused to roll over the unloading table (60").

5/ A method according to any one of claims 2 to 4, whereby each stack of pieces is driven over the unloading table (60) merely by bringing the unloading tool (80) to bear against the surface of the stack and by moving said tool.

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6/ A method according to claim 1, whereby, after it has been taken off from the remainder of the lay-up, each stack of pieces is accompanied by the unloading tool (80) to a collector device.

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7/ A method according to claim 1, whereby, after it has been taken off from the remainder of the lay-up, each stack of pieces is propelled to a collector device under movement imparted by the unloading tool (80).

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8/ A method according to claim 6 or 7, whereby the unloaded stacks of pieces are directed to at least one collector device to constitute predetermined sets.

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9/ A method according to any one of claims 6 or 7, whereby the unloaded stacks of pieces are directed to at least one collector bin (72a, 72b, 74a, 74b, 76).

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10/ A method according to claim 6 or 7, whereby the unloaded stacks of pieces are directed to a collector device (140; 166; 168) to form therein at least one queue ordered in predetermined manner.

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11/ A method according to claim 1, whereby at least some of the portions of the skeleton of the lay-up are removed automatically from the unloading table.

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12/ A method according to claim 11, whereby at least portions of the skeleton that are situated along the longitudinal edges of the lay-up are removed from the unloading table by automatic removal means (120a, 120b) that are distinct from the unloading tool (80).

13/ A method according to claim 1, whereby each set of a plurality of adjacent stacks in the lay-up whose pieces have shapes such that they are mutually interlocking is unloaded as a single stack.

5 14/ A method according to claim 1, whereby each stack of pieces of size smaller than a minimum predetermined value is included in a non-fragmented portion of the lay-up skeleton, the resulting set being unloaded as a single stack.

10 15/ A method according to claim 1, in which the lay-up is covered with a plastics film prior to cutting out the stacks of pieces, and characterized in that, prior to removing the stacks of pieces from the unloading table, the portion of plastics film cut out with each stack of pieces and situated on each stack is taken off automatically.

15 16/ A method according to claim 15, whereby each portion of plastics film situated on each stack of cut-out pieces is taken off by means of the unloading tool (80), and then removed.

20 17/ A method according to claim 15 or 16, whereby the portion of plastics film is taken off by suction.

18/ A method according to claim 1, whereby the unloaded stacks of pieces are wrapped individually;

25 19/ A method according to claim 1, whereby the unloaded stacks of pieces are marked.

30 20/ A method according to claim 19, whereby the marking is performed by marking means (100; 110) carried by the unloading tool, before the stacks of pieces are removed from the unloading table.

21/ A method according to claim 18 or 19, whereby the marking is performed after the stacks of pieces have been wrapped.

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22/ A method according to claim 1, whereby unloading and removal information is stored that is associated with the stacks of pieces and with at least some of the portions of skeleton, each item of said information comprising:

- 5 an unloading or removal rank;
- an item of pick-up information relating to the location to which the unloading tool should be brought on the stack of pieces or on the portion of skeleton;
- take-off information comprising information relating to a slide
- 10 direction to be followed by the stack of pieces or by the portion of skeleton; and
- an unloading or removal address.

23/ An installation for automatically cutting out and unloading stacks

15 of pieces from a lay-up (20) made up of superposed layers of sheet material, the installation comprising: a cutting table (10); first movement-imparting means (12) for moving a lay-up over the cutting table; a cutting tool (50); second movement-imparting means (46-49) for moving the cutting tool above the cutting table; a control unit

20 ((18) connected to the first and second movement-imparting means so as to cause the cutting tool and a lay-up carried by the cutting table to be moved relative to each other in order to cut out stacks of pieces from the lay-up as a function of stored lay-out information relating to the locations of the pieces to be cut out on the surface of the lay-up;

25 at least one unloading tool (80) for automatically unloading stacks of cut-out pieces; and third movement-imparting means (86-89) for moving the unloading tool and connected to the control unit so as, in particular, to bring the unloading tool up to the stacks of cut-out pieces to be unloaded;

- 30 an unloading table (60) above which the unloading tool (80) may be moved, the control unit (18) being organized for:

- controlling the relative movements between the cutting tool (50) and a lay-up carried by the cutting table (10) in order to cut up the skeleton of the lay-up into a plurality of portions; and

- 35 controlling the movements of the unloading tool (80) so as to bring it into contact with the stacks of cut-out pieces that arrive with a

lay-up on a surface (61) of the unloading table (60) situated downstream from the cutting table (10), and so as to take off the stacks of cut-out pieces successively from the remainder of the lay-up by moving them over the unloading table merely by moving them substantially parallel to the surface of the unloading table.

24/ An installation according to claim 23, whereby the surface (61) of the unloading table (60) has a plurality of orifices (66) and the unloading table is connected to blower means (64) so that it can support the stacks of cut-out pieces via a cushion of air.

25/ An installation according to claim 24, whereby the unloading table (60) is subdivided into a plurality of sectors suitable for being connected selectively to blower means.

26/ An installation according to claim 23, characterized in that the surface of the unloading table is provided with rolling means (67).

27/ An installation according to claim 23, further comprising a plurality of cutting tables, an unloading table, and means for moving the unloading table in order to bring it selectively to the ends of respective ones of the cutting tables.

28/ An installation according to claim 23, the unloading tool (80) being further mounted to move between a raised position and a lowered position so that it comes to bear against the top surface of a stack of cut-out pieces by being moved from its raised position to its lowered position.

29/ An installation according to claim 23, the unloading tool (80) being mounted on a tool support (82) which is mounted to move parallel to the unloading table (60) under the action of third movement-imparting means (86-89), the unloading tool further being mounted to rotate relative to the tool support about an axis perpendicular to the surface (61) of the unloading table.

30/ An installation according to claim 23, whereby the unloading table (80) is provided with at least one finger (90) suitable for being brought into contact with a top surface of a stack of cut-out pieces to be unloaded.

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31/ An installation according to claim 30, whereby the unloading tool (80") being provided with a plurality of fingers (90a, 90b, 90c) between which the spacing is variable.

10 32/ An installation according to claim 23, the unloading tool (80') being provided with suction means (98, 99).

15 33/ An installation according to claim 23, the unloading tool being provided with sweeping means (95) for sweeping the surface of the unloading table (60).

34/ An installation according to claim 23, the unloading tool being provided with a retractable needle.

20 35/ An installation according to claim 23, the unloading tool being provided with marking means (100, 110).

25 36/ An installation according to claim 23, further comprising collector means for receiving stacks of cut-out pieces unloaded from the unloading table.

37/ An installation according to claim 36, the collector means comprising a bin adjacent to the unloading table.

30 38/ An installation according to claim 37, the collector means comprising at least one conveyor mounted to move along one side or end of or under the unloading table.

35 39/ An installation according to claim 23, further comprising removal means (120a, 120b) distinct from the unloading tool for removing the cut-up portions of the lay-up skeleton from the unloading table (60).

40/ An installation according to claim 39, the removal means (120a, 120b) being disposed at least in part laterally relative to the unloading table (60).